MISSOURI DEPARTMENT OF HEALTH AND SENIOR SERVICES
ONSITE SEWAGE PROGRAM
REGISTERED OWTS PROFESSIONALS CEU EXERCISE

Math for Onsite Wastewater Treatment Systems

Questionnaire #110 **November 2007**

Available for a limited time

For Continuing Education Unit (CEU) credit, read the linked documents, complete the following questionnaire and return the completed questionnaire by either mailing to DHSS, Onsite Sewage Program, P.O. Box 570, Jefferson City, MO 65102, or faxing to 573-526-7377.	CEU	Installer	Inspector	OSE	Perc Tester
Minimum Standards for Lagoons, 19 CSR 20-3.060(6)(D) Basic Math section of the OWTS Installer Manual Soil report, site classification, and recommendations for Question 5	2.0	✔	✔	✔	✔
Question Number 6 –Optional Pressure Calculations	0.5	✔	✔	✔	✔

TOTAL POSSIBLE: 2.5 CEUs

I, _____ ___ ___ ___ ___ ___
Last First Middle Initial Professional ID Number(s)

have used the documents listed above and completed the following questions:

_____ _____ _____
Signature Contact Phone Number Date

1. A hypothetical soil evaluation indicates a 2.3-acre lot (250 feet by 400 feet) is suited to a lagoon system. The lagoon must be sized to serve a three-bedroom home. Below, show your calculations for sizing the lagoon, and on a separate sheet of paper (graph paper recommended), accurately draw a lagoon to serve this home. Draw both a plan layout and a cross-sectional view of the lagoon showing all lagoon dimensions. Show the following minimum setback distances: property lines, owner's house, neighbor's house, and a private well. *Hint: follow the design criteria found in 19 CSR 20-3.060(6)(D).*

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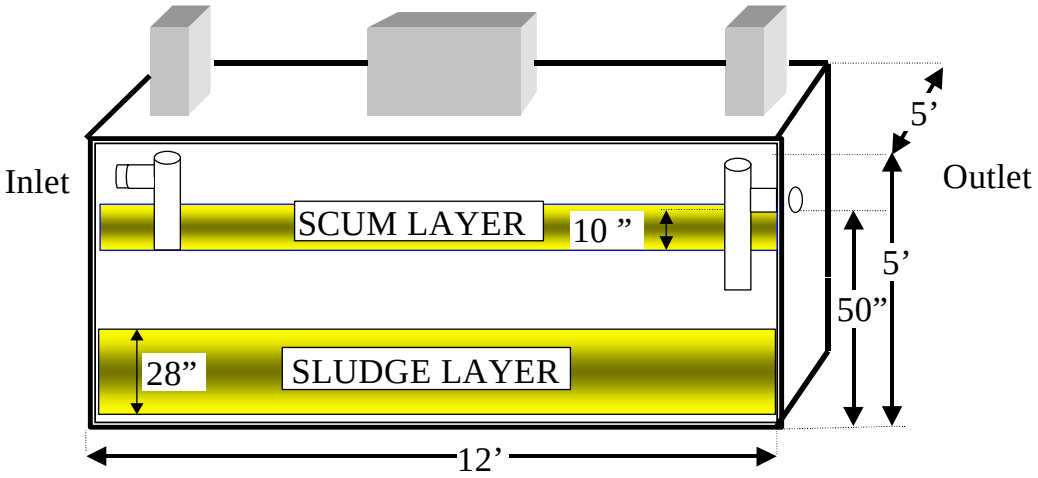

2. Using the graphic above and the math section of your installer manual, answer the following questions:

   a. Determine the liquid volume in the tank. _____ cubic feet

   b. Convert the liquid volume in question ‘2a’ to gallons. _____ gallons

   c. For a system serving two houses with a total of seven (7) bedrooms, what is the minimum required septic tank liquid volume?

   _____ gallons

   d. Would the volume calculated in question ‘2b’ above meet the minimum size requirements for the two houses? (Circle yes or no.)

   Yes No

   e. For a 7-bedroom system, determine the retention time for this tank. _____ hours

   f. Does this tank need to be pumped? (Circle yes or no.) Yes No

   Why? _____

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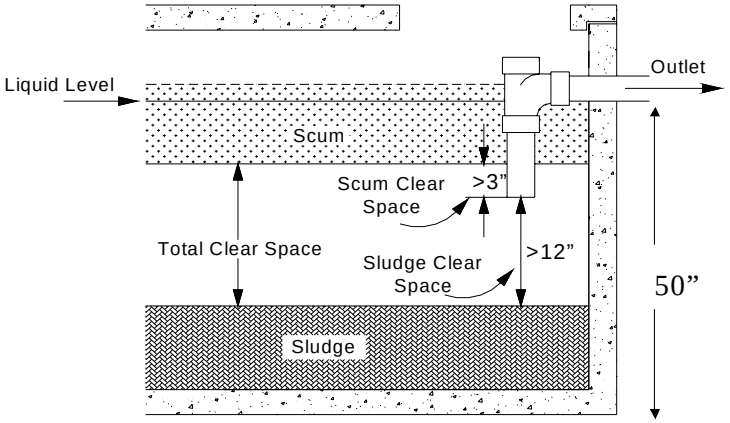
Septic Tank



Pump when scum clear space is <3" or sludge clear space is <12"

3. Using the diagram above, of a 1000-gallon concrete tank and the standards in 19 CSR 20-3-060(4), answer the following:

   a. The outlet tee/baffle must extend at least how far above the liquid surface? _____ inches

   b. The outlet baffle must extend below the liquid surface a distance of 40% of the liquid depth. How far below the liquid level should the baffle extend?
   _____ inches

   c. How far should the inlet be above the outlet level? _____ inches

   d. The inlet tee/baffle must extend to what depth below the liquid level? _____ inches

4. For this question, assume that you are to submit a bid for an OWTS to serve a two-bedroom home. The owner has already contacted a soil evaluator who determined that the soil loading rate for trenches 20 inches deep is 0.4 gallons per day per square foot. Using this information answer the following:

   a. What minimum size septic tank would be needed? _____ gallons

   b. What is the estimated daily flow? _____ gallons/day

   c. What is the minimum size of the treatment area (trench bottom area)? _____ square feet

   d. Is there enough information provided to determine the type and size of the treatment area? If not, what additional information would you need? (Circle yes or no.)
   Yes No

_____

_____

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5. For this question, assume that a homeowner contacts you about installing an onsite system for their new home. During your discussion with the owner you determine that the house is a four-bedroom home where the owner lives with his wife, three children and his elderly parents. He has a 10-acre parcel and knows a little about onsite systems and knows that he doesn't want a lagoon. You explain that you will need to have a soil evaluation done to determine the soil conditions and then use that information to select and design an onsite system. The homeowner agrees to have a soil evaluation done and asks that you keep him informed and that when you have a completed proposal to call and you can meet. Using the soil morphology report provided answer the following:

   a. What size septic tank is needed? _____ gallons

   b. What is the estimated daily flow? _____ gallons/day

   c. Can a conventional system be installed? (Circle yes or no.) Yes No

   d. At what depth would you install the lateral lines? _____ inches

   e. What soil loading rate would you use to size the system? _____ gallons/day/ft^2

   f. What is the minimum size of the treatment (trench bottom) area? _____ square feet

   g. Based on the equivalency in the Minimum Construction Standards, 19 CSR 20-3.060(5)(A)15.E., what is the minimum total length of lateral trench needed if 22-inch chambers are used?

      _____ feet

   h. Based on the minimum length of this system, what distribution method(s) would comply with the Minimum Construction Standards?

_____

_____

FOR AN OPTIONAL 0.5 CEUs:

6. Use the calculation tool provided on the web, http://www.dhss.mo.gov/Onsite/Pressuremanifolds.html, to calculate the minimum size of the absorption system and a pressure manifold layout for the situation in question '5'. **(Use the calculator default settings and the following: 85 feet of supply line with a diameter of 1½ inches, ¼-inch drilled holes, and 8 feet of elevation head.)** Answer the questions below and provide a drawing of how the system would be laid out. Include a trench detail drawing that shows the valve assembly and the number of holes per lateral line.

   a. What is the calculated output for minimum pump **flow capacity**? _____ gpm

   b. What is the calculated output for minimum pump **head capacity**? _____ feet

   c. What caution is offered if you choose 1¼-inch diameter supply line?

_____

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Last **First** **Middle Initial** **ID Number**

Please complete and return this sheet only if you want #110 answers sent to you (after exercise is taken offline).

Email Address _____

Fax Number _____

If fax number is not available, confirm your mailing address:

Address_____

City_____ State_____ Zip_____